

## CLINICAL PRACTICE

Frequent Overcrowding in  
U.S. Emergency DepartmentsROBERT W. DERLET, MD, JOHN R. RICHARDS, MD,  
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**Abstract.** **Objective:** To describe the definition, extent, and factors associated with overcrowding in emergency departments (EDs) in the United States as perceived by ED directors. **Methods:** Surveys were mailed to a random sample of EDs in all 50 states. Questions included ED census, frequency, impact, and determination of overcrowding. Respondents were asked to rank perceived causes using a five-point Likert scale. **Results:** Of 836 directors surveyed, 575 (69%) responded, and 525 (91%) reported overcrowding as a problem. Common definitions of overcrowding (>70%) included: patients in hallways, all ED beds occupied, full waiting rooms >6 hours/day, and acutely ill patients who wait >60 minutes to see a physician. Overcrowding situations were similar in academic EDs (94%) and private hospital EDs (91%). Emergency departments serving populations

≤250,000 had less severe overcrowding (87%) than EDs serving larger areas (96%). Overcrowding occurred most often several times per week (53%), but 39% of EDs reported daily overcrowding. On a 1–5 scale ( $\pm$ SD), causes of overcrowding included high patient acuity ( $4.3 \pm 0.9$ ), hospital bed shortage ( $4.2 \pm 1.1$ ), high ED patient volume ( $3.8 \pm 1.2$ ), radiology and lab delays ( $3.3 \pm 1.2$ ), and insufficient ED space ( $3.3 \pm 1.3$ ). Thirty-three percent reported that a few patients had actual poor outcomes as a result of overcrowding. **Conclusions:** Episodic, but frequent, overcrowding is a significant problem in academic, county, and private hospital EDs in urban and rural settings. Its causes are complex and multifactorial. **Key words:** emergency departments; overcrowding. ACADEMIC EMERGENCY MEDICINE 2001; 8:151–155

EMERGENCY departments (EDs) provide an extraordinarily important public service mission by providing emergency care 24 hours a day, 365 days per year without discrimination by social or economic status. Of the nation's 5,000 EDs, all have a physician physically present on the premises at all hours who can attend to patients with acute and chronic injuries and illnesses. One of the key foundations of EDs is the ability and expectation to provide immediate access and stabilization for those patients with medical emergencies. Recently there has been increasing discussion regarding the ability of EDs to provide timely care to patients with emergency medical conditions.<sup>1–3</sup> This

compromise in care is often attributed to the overcrowded conditions that have developed in EDs across this country. Anecdotal evidence suggests that many private, academic, and county EDs in both urban and rural communities are frequently experiencing significant delays in patient care compared with many years ago, when overcrowding occurred primarily in inner-city EDs on weekend nights. One state health department has investigated conditions responsible for prolonged waits and poor outcomes for patients in EDs.<sup>4</sup>

Although overcrowding has frequently been the topic of discussion among emergency physicians (EPs) throughout the years, few documented studies have investigated this phenomenon on a national level. Documentation of overcrowding has generally been limited to photographs of congested EDs combined with anecdotes rather than empirical data. Eight to ten years ago overcrowding in EDs was described in some metropolitan academic centers.<sup>5–8</sup> A number of articles in the lay press addressed the problem, but legislative remedies were not forthcoming. In 1990 a major, national news magazine focused on ED overcrowding as a detailed cover story.<sup>9</sup> In the ensuing years there appeared to be less publicity on the issue of over-

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TABLE 1. Emergency Departments Reporting Overcrowding as a Problem: Size of Population Served and Type of Facility

	Yes n (%)	No n (%)
Total	525 (91%)	50 (9%)
Population served		
≤250,000	259 (87%)	40 (13%)
>250,000	266 (96%)	10 (4%)
Facility type		
Academic/county	120 (94%)	8 (6%)
Private	405 (91%)	42 (9%)

crowding, and this may have been related to internal improvements in many hospitals. From 1990 through 1998 there was a significant increase in emergency medicine residency training programs, which may have helped the overcrowding situation in some academic hospitals.<sup>10</sup> Some hospitals attempted to enlarge and modernize their EDs in an effort to provide better service.

Despite scattered efforts in the early 1990s to alleviate this problem, we believe that overcrowding has once again become a national issue. In order to test this hypothesis, we conducted a nationwide survey to assess ED directors' perceptions of overcrowding in academic, county, and private EDs in urban and rural regions. This survey addressed four fundamental questions: 1) What is the extent of ED overcrowding in the United States? 2) What kinds of EDs are most affected by overcrowding? 3) What do ED directors perceive as the causes of overcrowding? 4) What are the adverse consequences for patients?

## METHODS

**Study Design and Participants.** This was a prospective survey study of ED directors in all 50 states. The study was approved by the human subjects review committee as meeting federal exemption from informed consent.

**Study Protocol.** Between November 1998 and May 1999, surveys were mailed to a random sample of ED directors in all 50 states identified from a list published by the American Hospital Association. Included surveys were returned by May 1999. Randomization was accomplished by computed algorithm. An academic hospital was defined as having an associated Accreditation Council for Graduate Medical Education-approved residency program. A county hospital was defined as one designated and funded by its respective county government to provide care to its indigent population. It was recognized that many academic hospitals

also serve as county facilities, and that smaller community hospitals may have only a single associated residency program. Specialty hospitals, such as children's, were not included. The definition of private hospital included all other types of facilities, such as for-profit community and health maintenance organization (HMO) hospitals.

**Survey Content and Administration.** The survey included questions regarding regional population demographics, annual ED census, and ED bed capacity. Additional questions inquired whether ED overcrowding was ever a problem at the particular ED, and if so, how often it occurred. Emergency department directors were asked to estimate the impact of overcrowding on patients presenting to the ED in terms of long waits, delayed diagnosis and treatment, risk for poor outcomes, and actual poor outcomes. They were also asked to rank putative causes of ED overcrowding on a five-point Likert scale: 1 = not a cause; 2 = minor; 3 = somewhat; 4 = major; 5 = severe. Possible perceived causes included: 1) increasing ED volume, 2) increasing patient acuity, 3) managed care issues, 4) insufficient ED space, 5) nursing shortage, 6) physician shortage, 7) radiology delays, 8) lab delays, 9) delays in consultation, and 10) hospital bed shortage. Emergency department directors were asked to characterize overcrowding from a list of circumstances they believed best defined overcrowding. Choices provided were: 1) patients wait >30 minutes to see a physician; 2) patients wait >60 minutes to see a physician; 3) all ED beds are filled >6 hours/day; 4) patients are placed in hallways >6 hours/day; 5) EPs feel rushed >6 hours/day; and 6) waiting room is filled >6 hours/day. Respondents were also provided the opportunity to write in other definitions of overcrowding.

**Data Analysis.** This was a descriptive study. Data are reported as mean  $\pm$  standard deviation (SD) unless otherwise specified.

## RESULTS

Of 836 ED directors surveyed, 575 (69%) responded to all questions. There were 28 questionnaires that were returned incomplete, and were not included in the analysis. Responders were not significantly different from nonresponders with regard to type of facility, surrounding population served, and hospital size. A total of 525 EDs (91%) reported overcrowding as a problem. Emergency departments serving populations less than 250,000 reported less overcrowding (87%) than those serving larger populations (96%). Prevalences of overcrowding were similar in academic, county, and private EDs (Table 1). Overcrowding was also re-

ported to be more of a problem in EDs with larger annual census (Table 2). Of the 50 EDs not reporting overcrowding as a problem, the mean annual volume of patients was significantly smaller than that of overcrowded EDs (22,800 vs 36,100).

Perceived causes of overcrowding are shown in Table 3. On a 1–5 Likert scale, highest ranking causes of overcrowding included increasing patient acuity ( $4.3 \pm 0.9$ ), hospital bed shortage ( $4.1 \pm 1.1$ ), increasing ED patient volume ( $3.8 \pm 1.2$ ), radiology and laboratory delays ( $3.4 \pm 1.2$ ), and insufficient ED space ( $3.4 \pm 1.4$ ). Consultant delays ranked higher for academic and county than private EDs, as did nursing shortages. Managed care issues and insufficient ED space ranked higher in private than in academic and county EDs. No significant difference in ranking was noted between EDs serving populations greater or less than 250,000.

A total of 156 (30%) of the ED directors reported that overcrowding has always been a problem (Table 4). The majority ( $n = 273$ , 52%), however, reported overcrowding developed within the preceding three years and the remainder ( $n = 96$ , 18%) reported that overcrowding developed within the preceding year. Fifty-three percent of the directors

TABLE 4. Selected Circumstances Defining Emergency Department (ED) Overcrowding ( $n = 327$ )

Specific Circumstance	Total (% Yes)
Patients wait >60 minutes to see physician	71
All ED beds filled >6 hours/day	70
Patients placed in hallways >6 hours/day	74
Emergency physicians feel rushed >6 hours/day	64
Waiting room filled >6 hours/day	70

reported that overcrowding occurred most often several times per week, but 39% reported daily overcrowding. The time period from 3 PM to 11 PM was associated with the worst overcrowding ( $4.5 \pm 1.7$  days per week), followed by 7 AM to 3 PM ( $2.8 \pm 1.8$  days per week).

With regard to the impact of overcrowding on patient care, 77% of ED directors indicated that many patients had long waiting times. Delays in diagnosis and treatment were reported to have been experienced by many patients in 37% of EDs. Higher risk of poor outcome as a result of overcrowding was reported by 67% of the directors, and 33% reported that a few patients had actual poor outcomes. Estimated impact on patients using emergency services during overcrowded conditions was queried, and long patient waits were reported by 37%, delays in diagnosis and treatment by 26%, and extended pain and suffering by 18%. The definition of overcrowding based on selected circumstances chosen by ED directors is shown in Table 4.

## DISCUSSION

In this study, frequent overcrowding appears to be a significant nationwide problem according to ED directors. Overcrowding may not be limited to academic and county hospital EDs in major cities, but may also affect many private hospital EDs in both urban and rural settings. It is significant that private ED directors now report overcrowding. Discussion in the early 1990s provided evidence that overcrowding was primarily limited to teaching hospitals. In our survey, private ED directors indicated that the problem of overcrowding was relatively new, with 76% indicating the problem had developed in the past three years.

Our study also revealed that the perceived causes of overcrowding are complex and multifactorial. The most important factor in the genesis of overcrowding was increasing patient acuity and complexity. As the population of the United States ages and life expectancy increases, higher numbers of patients with several concomitant medical problems, such as congestive heart failure and chronic obstructive pulmonary disease, present to the ED.

TABLE 2. Emergency Department Overcrowding and Annual Census (in Thousands, Mean  $\pm$  SD)

	Overcrowded ( $n = 525$ )	Not Overcrowded ( $n = 50$ )
Total	36.1 $\pm$ 20.5	22.8 $\pm$ 19.4
Population served		
$\leq 250,000$	31.8 $\pm$ 18.2	19.5 $\pm$ 11.4
>250,000	45.4 $\pm$ 20.3	37.8 $\pm$ 33.2
Facility type		
Academic/county	44.6 $\pm$ 28.9	23.5 $\pm$ 4.5
Private	34.3 $\pm$ 17.7	20.9 $\pm$ 14.2

TABLE 3. Reported Causes for Emergency Department (ED) Overcrowding

Reason	Total* ( $n = 525$ )
Increasing patient acuity	4.3 $\pm$ 0.9
Hospital bed shortage	4.1 $\pm$ 1.1
Increasing ED volume	3.8 $\pm$ 1.2
Radiology delays	3.4 $\pm$ 1.1
Insufficient ED space	3.4 $\pm$ 1.4
Laboratory delays	3.4 $\pm$ 1.2
Consultation delays	3.2 $\pm$ 1.2
Nursing shortage	2.9 $\pm$ 1.3
Physician shortage	2.3 $\pm$ 1.2
Managed care issues	2.0 $\pm$ 1.3

\*Mean  $\pm$  SD. Scale: 1 = not a cause; 2 = minor; 3 = moderate; 4 = major; 5 = severe.

These patients require a higher level of care than younger patients, and take more physician and nursing time to diagnose and treat. Furthermore, when telemetry or intensive care units (ICUs) are filled, the ED becomes the de-facto ICU and may have very limited ability to provide service to new patients presenting to the ED. The situation has the potential for danger, as the ED staff becomes overwhelmed with caring for critical or high-risk patients who have no hospital bed while ambulances continue to arrive with seriously ill or injured patients. At this point many EDs must close to all ambulance traffic in order to cope, resulting in a public health dilemma. Another factor exacerbating this issue is increasing ED volume. As the population continues to increase, demand on emergency services will grow accordingly. However, more EDs are closing than are being built, and there appears to be no incentive for expanding existing EDs to cope with this increase in patient volume.

No simple definition to succinctly describe overcrowding exists. Based on agreement between ED directors on this issue (Table 4), perhaps the definition of overcrowding in the ED should include any of the following: All available beds in the ED are full >6 hours/day, admitted patients are placed in ED hallways because there are no inpatient beds available >6 hours/day, or the number of hours the ED is closed because of saturation or on diversion to ambulance traffic. Many causes of overcrowding in the ED were related to support services normally not controlled by the ED. One of the most significant was hospital bed shortage. When all hospital beds are full, patients who need admission must wait in the ED. These patients occupy space and are often placed in the ED hallways, which frequently results in unsatisfactory care from the viewpoint of the patient, the patient's family, and ED staff. Admitted patients forced to wait in the ED also require nursing and physician attention, which may limit evaluation and treatment of new patients.

Consultation delay was also ranked highly as a cause of overcrowding. In some cases, consultants are needed to treat patients in the ED prior to discharge, or are needed to actually admit patients to the hospital. We expected that delays in laboratory and radiology services would be limited to academic and county hospital EDs. However, private ED directors also reported difficulty in perceived delivery of laboratory and radiology services. In the past, ED nursing shortages were believed to contribute to the overcrowding problem. In our survey we found that a nursing shortage was reported to be more of a contributing cause in academic and county EDs than in private institutions. Our study was also notable in that ED directors

identified insufficient ED space as a significant cause of the overcrowding issue.

The potential impact of overcrowding on patients is most worrisome. The largest impact was the long waiting times that patients experience. This not only results in frustration to patients and their families and friends, but can prolong pain and suffering. It was concerning that 33% of ED directors reported that a few patients experienced actual poor outcomes as a result of overcrowding. As the population increases, utilization of emergency services will surely increase as well. It seems likely that more patients will sustain poor outcomes because of overcrowding in EDs.

The problem of ED overcrowding is not unique to the United States and is actually more of a problem in other countries, many of which have government-operated and -financed social health systems. Boyle and colleagues reported that EDs in Quebec, Canada, frequently experienced overcrowding, resulting in long patient waiting times, ambulance diversions, and both patient and physician dissatisfaction.<sup>11</sup> As in our study, one of the key factors for Canadian overcrowding is lack of inpatient hospital beds. The Quebec government successfully improved this situation with a \$178 million, 28-component plan to increase the number of inpatient beds and decrease hospital length of stay for inpatients. A recent case report attributed a patient death to overcrowding.<sup>12</sup> Rund and associates compared ED utilization rates between the United States and the United Kingdom and determined that citizens of both countries consider the ED to be a convenient source of immediate medical care for nonurgent medical problems.<sup>13</sup> This type of ED utilization increases ED volume and strains resources, thereby compromising the ability to provide high-quality emergency care to critically ill patients. In Australia, as in the United States, diversion of ambulances away from EDs has become a problem in metropolitan areas.<sup>14</sup> Shih and colleagues described overcrowding at the Taiwan University Hospital to be so severe that 4% of admitted patients actually remained in the ED four days or longer.<sup>15</sup>

Overcrowding in American academic and county hospitals was previously investigated in the late 1980s and early 1990s. Andrulis and coworkers reported in a 1988 survey prolonged delays for patients in the ED waiting to be admitted to teaching hospitals.<sup>6</sup> Grumbach and colleagues identified a serious overcrowding problem at San Francisco General Hospital and believed triage of patients with nonurgent conditions could help alleviate much of the congestion.<sup>16</sup> However, many of these patients were low-income and/or homeless and had no transportation, making triage to satellite clinics difficult to achieve. Specific proposals to address

overcrowding have been published in the past.<sup>17</sup> On the basis of our survey, it appears these proposals were not entirely successful.

## LIMITATIONS AND FUTURE QUESTIONS

This study has a number of limitations. First of all it is a survey, and responses are voluntary and subjective. The survey was sent to ED directors and reflects the knowledge, experience, and opinions of those ED directors who responded. However, ED directors usually have a good sense of the operational reality of their EDs. Causes of overcrowding were measured using an integer scale with adjective descriptions such as minor, moderate, and major. This represents a perceived degree of the overcrowding problem by ED directors. Although several circumstances and factors associated with overcrowding were included in the survey, no standard method has been established for actually defining overcrowding. Some community hospitals may have had one or two associated residency programs and were included in the academic hospital category, which may have affected comparisons, but this number was likely small. The study was conducted in winter–spring and may reflect seasonal usage of EDs. Future studies addressing the problem of overcrowding are needed, with empirical data rather than anecdotes.

## CONCLUSIONS

Frequent overcrowding is a serious problem according to directors of academic, county, and private hospital EDs in urban and rural settings. Overcrowding results in long waiting times for patients, and possibly increases the risk of adverse outcomes. Its causes are multifactorial and are beyond the control of most EDs. Public policy should address the problem of ED overcrowding on a national basis.

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